

# Novel Approach In Fabrication Of Shielding Composite Materials By Emerging Field Assisted Sintering Technique (FAST), Phase I

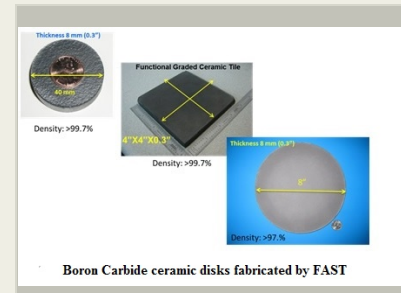
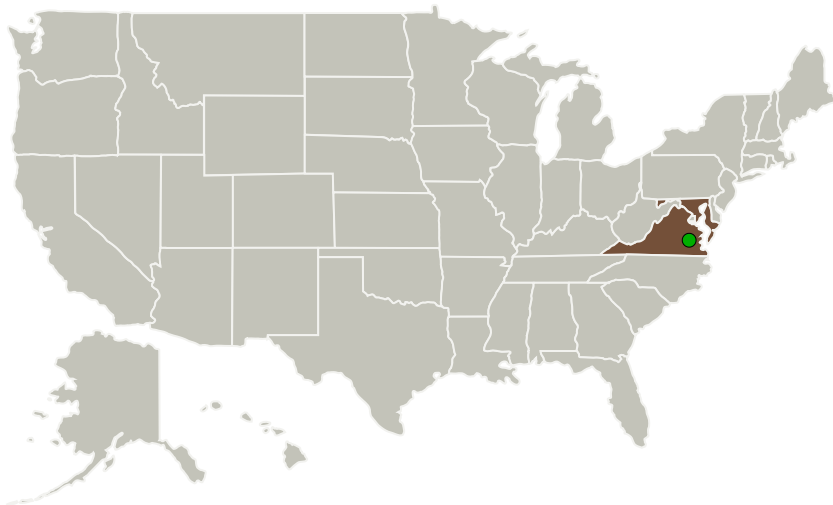
Completed Technology Project (2015 - 2015)



## Project Introduction

The overall objective of this work is to develop a radiation shielding material system that is sufficiently strong to serve as a load bearing structure. Such a materials system does not currently exist. The ideal shielding material for space applications should preferably be light weight with good mechanical strength and good thermal conductivity. We propose a novel approach to fabricate reinforced composite materials for radiation shielding applications using a powder metallurgy approach with sintering via the innovative Field Assisted Sintering Technology (FAST). The composite materials that we propose include various compositions of boron carbide (B<sub>4</sub>C) and tungsten carbide (WC) in either an aluminum matrix or in a polymer matrix of ultra-high molecular weight polyethylene (UHMWPE). FAST (also called spark plasma sintering- SPS) is an innovative process that sinters powder with near 100% theoretical density and very limited to no grain growth. FAST is a one step process that is highly flexible and robust, with short processing cycles (100-1000 times faster). It is much more cost effective in comparison to conventional compaction and sintering methods, and it is also amenable to large scale production.

## Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
Brimrose Technology Corporation(BTC)	Lead Organization	Industry	Sparks, Maryland
● Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

Primary U.S. Work Locations	
Maryland	Virginia

## Project Transitions

**June 2015:** Project Start

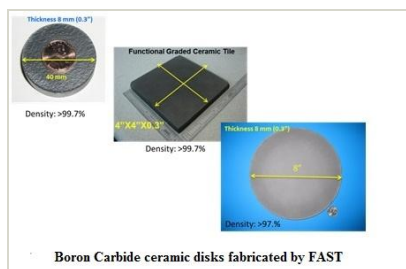
**December 2015:** Closed out

**Closeout Summary:** Novel Approach In Fabrication Of Shielding Composite Materials By Emerging Field Assisted Sintering Technique (FAST), Phase I Project Image

**Closeout Documentation:**

- Final Summary Chart Image(<https://techport.nasa.gov/file/139289>)

## Images



### Briefing Chart Image

Novel Approach In Fabrication Of Shielding Composite Materials By Emerging Field Assisted Sintering Technique (FAST), Phase I  
(<https://techport.nasa.gov/image/131255>)

## Organizational Responsibility

### Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

### Lead Organization:

Brimrose Technology Corporation (BTC)

### Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

### Program Director:

Jason L Kessler

### Program Manager:

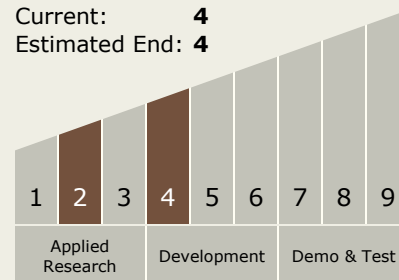
Carlos Torrez

### Principal Investigator:

Sudhir B Trivedi

## Technology Maturity (TRL)

Start: **2**  
Current: **4**  
Estimated End: **4**



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## Technology Areas

### Primary:

- TX06 Human Health, Life Support, and Habitation Systems
  - └ TX06.5 Radiation
    - └ TX06.5.3 Protection Systems

## Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System